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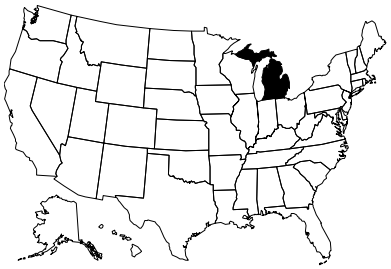

Contact Information

William Creal, Environmental Manager
Michigan Department of Environmental Quality (MDEQ)
P.O. Box 30273 ■ Lansing, MI 48909
Phone 517/335-4181 ■ Fax 517/241-8133
email: crealw@michigan.gov
MDEQ Water homepage: http://www.michigan.gov/deq/1,1607,7-135-3313---,00.html

Program Description

In 1997, the Michigan Department of Environmental Quality (MDEQ) completed a report entitled, *A Strategic Environmental Quality Monitoring Program for Michigan's Surface Waters* (Strategy). This Strategy describes the monitoring activities necessary for a comprehensive assessment of water quality in Michigan's surface waters. One component of the Strategy is expanded and improved monitoring of biological integrity and physical habitat.

This program element includes all monitoring conducted for fish and benthic invertebrate community structure, nuisance aquatic plants, algae, and slimes, and assessment of physical habitat. The MDEQ's goal in conducting watershed surveys is to assess 80 percent of the stream and river miles in Michigan over a five-year period.

Enhanced biological integrity and physical habitat monitoring is consistent with existing MDEQ programs and activities. MDEQ uses the existing five-year basin units defined by the NPDES permitting program, which includes 45 watershed units based on drainage to the four Great Lakes. Monitoring activities in each watershed include not only biological integrity, but also fish and wildlife contaminant studies, water chemistry, and sediment chemistry. Integrating the enhanced biological monitoring with the other activities, within the framework of the five-year permitting cycle, will ensure that the monitoring is closely linked with other MDEQ programs and contributes to resource management decisions. Specific objectives of biological integrity and physical habitat monitoring are to:

1. Determine whether waters of the state are attaining standards for aquatic life.
2. Assess the biological integrity of the waters of the state.
3. Determine the extent to which sedimentation in surface waters is impacting indigenous aquatic life.
4. Determine whether the biological integrity of surface waters is changing with time.
5. Assess the effectiveness of BMPs and other restoration efforts in protecting and/or restoring biological integrity and physical habitat.
6. Evaluate the overall effectiveness of MDEQ programs in protecting the biological integrity of surface waters.
7. Identify waters that are high quality, as well as those that are not meeting standards.
8. Identify the waters of the state that are impacted by nuisance aquatic plants, algae, and bacterial slimes.

Rapid, qualitative biological assessments of wadeable streams and rivers are conducted using the Great Lakes and Environmental Assessment Section Procedure 51, which compares fish and benthic invertebrate communities at a site to the communities that are expected at an un-impacted, or reference, site. This is a key tool used by MDEQ to determine whether waterbodies are attaining Michigan WQS. Because Procedure 51 is meant to be a qualitative, rapid assessment tool, the MDEQ established a contract with the Great Lakes Environmental Center to develop a statistically valid sample design and procedure for detection of trends using benthic macroinvertebrates. This project is scheduled for completion in January 2003.

All biological community data are entered into MDEQ's MS Access database. Biological and habitat data collected as part of the five-year watershed surveys are summarized in watershed reports. The list of these reports is stored in a database that will be accessible to the public via the MDEQ Surface Water Quality Division's website.

Documentation and Further Information

Michigan Water Quality Report (Year 2000 305(b) Report):
http://www.michigan.gov/deq/1,1607,7-135-3313_3686_3728-12711--,00.html

CWA Section 303(d) List: Michigan Submittal for Year 2002:
http://www.deq.state.mi.us/documents/deq-swq-gleas-303_d_Rpt2002b.pdf

Michigan's WQS, revised April 1999: http://www.deq.state.mi.us/documents/deq-swq-gleas-305b2002Appl.doc

MDEQ Biosurveys website:
http://www.michigan.gov/deq/0,1607,7-135-3313_3686_3728-32369--,00.html

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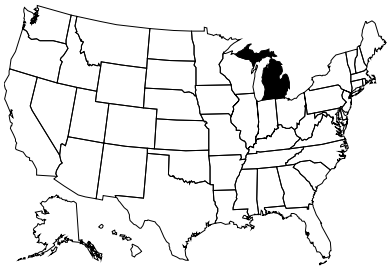

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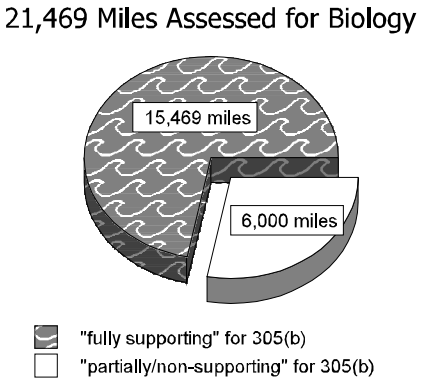
Programmatic Elements

Uses of bioassessment within overall water quality program	✓	problem identification (screening)
	✓	nonpoint source assessments
	✓	monitoring the effectiveness of BMPs
	✓	ALU determinations/ambient monitoring
		promulgated into state water quality standards as biocriteria
	✓	support of antidegradation
	✓	evaluation of discharge permit conditions
	✓	TMDL assessment and monitoring
		other:
Applicable monitoring designs	✓	targeted (i.e., sites selected for specific purpose) *(special projects only)*
		fixed station (i.e., water quality monitoring stations)
		probabilistic by stream order/catchment area
		probabilistic by ecoregion, or statewide
	✓	rotating basin *(specific river basins or watersheds and comprehensive use throughout jurisdiction)*
		other:

Stream Miles

Total miles *(determined using RF3)*	**49,141**
Total perennial miles	27,873
Total miles assessed for biology	**21,469**
fully supporting for 305(b)	15,469
partially/non-supporting for 305(b)	6,000
listed for 303(d)	2,600
number of sites sampled	3,500
number of miles assessed per site	–



Aquatic Life Use (ALU) Designations and Decision-Making

ALU designation basis	Warm Water vs. Cold Water	
ALU designations in state water quality standards	Three designations: coldwater fisheries, warmwater fisheries, and other indigenous aquatic life and wildlife (per Rule 100 of Michigan's WQS). Coldwater fishery includes any of the following: trout, salmon, whitefish, cisco. Warmwater fishery includes fish species that thrive in relatively warmwater, including any of the following: bass, pike, walleye, panfish.	
Narrative Biocriteria in WQS	none*	
Numeric Biocriteria in WQS	none	
Uses of bioassessment data in integrated assessments with other environmental data (e.g., toxicity testing and chemical specific criteria)	✓	assessment of aquatic resources
	✓	cause and effect determinations
	✓	permitted discharges
	✓	monitoring (e.g., improvements after mitigation)
	✓	watershed based management
Uses of bioassessment/ biocriteria in making management decisions regarding restoration of aquatic resources to a designated ALU	TMDL listing and delisting decisions	

*Michigan does not have narrative biocriteria, per se. However, MI does have tiered ALU designations and numeric procedures (the Gleas Procedure #51) to implement WQS, evaluate nonpoint source impacts, and assess designated uses. According to MDEQ's *Qualitative and Biological Biological Survey Protocols for Wadeable Streams and Rivers* (Procedure #51), "The development of these biological and habitat survey protocols was a result of the increasing demand for a more vigorous and standardized evaluation of nonpoint source impacts. The nature and diversity of the causes of nonpoint pollution created a need for greater refinement and sophistication of the Surface Water Quality Division's standard biological survey procedures in order to assess the degree and causes of these biological impacts."

Reference Site/Condition Development

Number of reference sites	**200 total**	
Reference site determinations	✓	site-specific
		paired watersheds
		regional (aggregate of sites)
		professional judgment
		other:
Reference site criteria	excellent biota present	
Characterization of reference sites within a regional context *Not applicable*		historical conditions
		least disturbed sites
		gradient response
		professional judgment
		other:
Stream stratification within regional reference conditions	✓	ecoregions (or some aggregate)
		elevation
		stream type
		multivariate grouping
		jurisdictional (i.e., statewide)
		other:
Additional information		reference sites linked to ALU
		reference sites/condition referenced in water quality standards
	✓	some reference sites represent acceptable human-induced conditions

Field and Lab Methods

Assemblages assessed	✓	benthos *(>500 samples/year; single season, multiple sites - watershed level)*
	✓	fish *(<100 samples/year; single season, multiple sites - watershed level)*
		periphyton
		other:
Benthos		
sampling gear		D-frame and dipnet; 800-900 micron mesh
habitat selection		multihabitat
subsample size		100 count
taxonomy		combination - family, genus
Fish		
sampling gear		backpack electrofisher and pram unit (tote barge)
habitat selection		multihabitat
sample processing		length measurement and anomalies
subsample		none
taxonomy		species
Habitat assessments		visual based; performed with bioassessments
Quality assurance program elements		standard operating procedures, quality assurance plan, periodic meetings and training for biologists, specimen archival

Data Analysis and Interpretation

Data analysis tools and methods	✓	summary tables, illustrative graphs
		parametric ANOVAs
		multivariate analysis
	✓	biological metrics *(aggregate metrics into an index)*
		disturbance gradients
		other:
Multimetric thresholds		
transforming metrics into unitless scores		Two standard deviations from excellent condition
defining impairment in a multimetric index		Two standard deviations from excellent condition
Evaluation of performance characteristics	✓	repeat sampling
	✓	precision *(repeat sampling by teams during round robins over the years)*
		sensitivity
		bias
		accuracy
Biological data		
Storage		MS Access database, spreadsheets
Retrieval and analysis		SAS, Systat and Statistica